

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION

(PCT Article 36 and Rule 70)

REC'D 26 APR 2005
INTERNATIONAL EXAMINATION REPORT

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Applicant's or agent's file reference 497809 MSB/jal	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. PCT/NZ2003/000286	International Filing Date (day/month/year) 22 December 2003	Priority Date (day/month/year) 20 December 2002	
International Patent Classification (IPC) or national classification and IPC Int. Cl. 7 F04B 43/12, 45/08			
Applicant IMPIAN TECHNOLOGIES LIMITED et al			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 11 sheet(s).

3. This report contains indications relating to the following items:

I	<input checked="" type="checkbox"/> Basis of the report
II	<input type="checkbox"/> Priority
III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input checked="" type="checkbox"/> Lack of unity of invention
V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/> Certain documents cited
VII	<input type="checkbox"/> Certain defects in the international application
VIII	<input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 15 July 2004	Date of completion of the report 4 April 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer ASANKA PERERA Telephone No. (02) 6283 2373

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
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I. Basis of the report

1. With regard to the elements of the international application:*

the international application as originally filed.

the description, pages 1-3, 5, 6, 8, 10-12, 14-16, 18-27, as originally filed,
pages , filed with the demand,

the claims, pages 28-30, 32-34, 39 as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,

the drawings, pages 1/17, 3/17-17/17 as originally filed,
pages , filed with the demand,

the sequence listing part of the description:

pages , as originally filed

pages , filed with the demand

pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language which is:

the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

the language of publication of the international application (under Rule 48.3(b)).

the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. The amendments have resulted in the cancellation of:

the description, pages

the claims, Nos.

the drawings, sheets/fig.

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

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IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- restricted the claims.
- paid additional fees.
- paid additional fees under protest.
- neither restricted nor paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- complied with.
- not complied with for the following reasons:

See Supplemental Box

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- all parts.
- the parts relating to claims Nos.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-77	YES
	Claims	NO
Inventive step (IS)	Claims 1-77	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-77	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

The following documents identified in the International Search Report are identified as the closest prior art for the purposes of this report:

D1 : US 4178138A
D2 : US 3955902A
D3 : JP 2001-017543A (English Abstract)
D4 : US 4530647A
D5 : GB 2138511A
D6 : WO 2001/091831A
D7 : EP 0776670A2

However none of these citations disclose or fairly teach the features of the inventions as defined by the above claims 1-77.

Therefore the subject matter of these claims is new and meets the requirements of Article 33(2) PCT with regard to novelty.

Therefore the subject matter of these claims is not obvious and meets the requirements of Article 33(3) PCT with regard to inventive step.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of Box IV.3

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Preliminary Examining Authority has found that there are different inventions as follows:

1. Claims 1-9, 10-22, 23-27 are directed to a tube holder, a combination of a tube holder and a pump head having a tapered rotor and a method of loading a tube into a tube holder respectively. It is considered that the tube being insertable in a tube race by movement in a substantially orthogonal direction relative to the race so that it extends through a first tube inlet, around a first race part, out through a first tube outlet, in through a second tube inlet, around a second race part and out through a second tube outlet comprises a first "special technical feature".
2. Claims 28-44 are directed to a combination of a peristaltic pump head having a tapered rotor and a tube holder. It is considered that a tube race including a plurality of separate race parts around a recess for receipt of the tapered end of the rotor such that the tube can exit and re-enter the tube race comprises a second "special technical feature".
3. Claims 45-50 are directed to a peristaltic pump head. It is considered that a axially biased tapered pump rotor including gear teeth engaging teeth of a gear in a transmission mechanism wherein the teeth of both gears are of sufficient length to remain engaged during axial movement of the rotor relative to a housing comprises a third "special technical feature".
4. Claims 51-57 are directed to a kit of parts for assembling a peristaltic pump head assembly. It is considered that a housing having two parts and configured to receive a rotor such that the assembly can be assembled by snapping the housing parts together without the use of adhesives or separate fasteners comprises a fourth "special technical feature".
5. Claims 58-59 and 60-66 are directed to a flexible container having a reservoir for holding fluid and including a tube holder directly connected to it. It is considered that tube holder having tube race around a tapered aperture or recess for receipt of a tapered rotor of a peristaltic pump head and a resiliently flexible tube in fluid communication with the reservoir and extending around the tube race comprises a fifth "special technical feature".
6. Claims 67-77 are directed to a container holding at least one fluid for dispensing by a peristaltic pump. It is considered that a plurality of magnetic or magnetisable areas in predetermined positions to identify the container and configured for detection by a pump assembly having a plurality of sensors in corresponding predetermined positions comprises a sixth "special technical feature".

Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions; as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

In accordance with a second aspect of the present invention, there is provided a method of loading a tube into a tube holder including:

- providing a tube holder having a housing having a recess for receipt of a pump rotor, a tube race for receipt of a tube around the recess and having a first race part around one part of the recess and a second race part around another part of the recess, a first tube inlet into the first race part and a first tube outlet from the first race part, a second tube inlet into the second race part and a second tube outlet from the second race part;
- 5 providing a tube; and
- 10 moving the tube in a substantially orthogonal direction relative to the tube race such that it extends in through the first tube inlet, around the first race part, out through the first tube outlet, in through the second tube inlet, around the second race part, and out through the second tube outlet.
- 15 The tube holder may be as outlined in the first aspect above.

The tube holder preferably includes a retainer which is in the form of a projection or lip between the first outlet and the second inlet, and the method may further include pulling the installed tube in a direction away from the projection or lip so that the tube is maintained in position within the tube race with part of the tube located behind the projection or lip.

- 20
- 25 The method suitably includes bringing the tube holder into engagement with a pump head to provide the combination of a tube holder and a pump head, and so that the rotor is located in the recess in the tube holder.

The combination may be as outlined above.

- 30 In accordance with a third aspect of the present invention, there is provided the combination of a peristaltic pump head having a tapered pump rotor which is rotatable about an axis of rotation, and a tube holder having a recess for receipt of the tapered end

transmission mechanism are of sufficient length to remain engaged during axial movement of the rotor relative to the housing.

The gear teeth of the rotor are suitably elongate and longer than the teeth of the gear.

5

Preferably, the transmission mechanism includes a plurality of gears.

The rotor may be axially biased by a compression spring.

10 The pump head preferably includes a stop to limit the axial movement of the rotor relative to the housing. The stop may be in the form of an annular lip on the rotor.

In accordance with a fifth aspect of the present invention, there is provided a kit of parts for assembling a peristaltic pump head assembly, including:

15 a rotor and a housing having first and second housing parts and configured for receipt of the rotor; which rotor may be assembled with the housing with at least part of the rotor exposed from the housing for engagement with a tube, by snapping the housing parts together such that the pump head assembly can be assembled without the use of adhesives or separate fasteners.

20

Advantageously, the rotor is provided in kit form, and includes a main body part, a head part and at least one roller, which rotor may be assembled by snapping the main body part and head part together to sandwich the roller(s) therebetween.

25 Preferably, the rotor is tapered and is mountable for rotation about an axis of rotation within the housing and to be axially biased towards its tapered end, and wherein the rotor includes a stop to limit the axial movement of the rotor relative to the housing when assembled.

30 The kit may include a compression spring to axially bias the rotor relative to the housing.

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races so that the contents of the reservoirs can be independently dispensed via respective tubes.

5 Preferably, the tube race(s) has/have a first race part around one part of the recess and a second race part around another part of the recess, a first tube inlet into the first race part and a first tube outlet from the first race part, a second tube inlet into the second race part and a second tube outlet from the second race part; the respective tube being insertable in the respective tube race by movement in a direction substantially orthogonal to the tube race so that it extends in through the first tube inlet, around the first race part, out through the first tube outlet, in through the second tube inlet, around the second race part, and out through the second tube outlet.

10 The tube holder preferably includes a lip or projection between the first outlet(s) and second inlet(s), behind which the respective tube can be located to maintain the tube in position within the tube race.

15 The container preferably includes a neck portion and two separate reservoir portions in a Y-configuration.

20 The tube holder may include at least one mounting boss which is located in an aperture in a neck of the container.

25 An aperture may extend through the mounting boss(es) and into a spigot(s) which comprise(s) the tube connector to which a respective tube is connected, such that tube(s) is/are in fluid communication with a respective reservoir.

30 In accordance with an eighth aspect of the present invention, there is provided a container holding at least one fluid for dispensing by a peristaltic pump, the container including a plurality of discrete magnetic or magnetisable areas in predetermined positions on the container to identify the container, which magnetic or magnetisable areas (once magnetised) are configured for detection by a pump assembly having a plurality of sensors in

Figure 21 shows the sachet and tube holder of Figure 19 connected to the pump assembly of Figure 14;

5 Figure 22 shows the sachet and tube holder of Figure 17, including magnets forming a coding system; and

Figure 23 schematically shows a pump assembly configured to read the coding system of the tube holder of Figure 22.

10

DETAILED DESCRIPTION OF PREFERRED FORMS

With reference to Figure 1, the peristaltic pump assembly has a main housing 1 carrying a rotor 3, which is received in a tube holder 105. The peristaltic pump head pumps fluid through a tube maintained in the tube holder 105, by the rotor compressing the tube and pushing fluid therethrough, this process known as occlusion. Two alternative preferred tube holders will be described below with reference to Figures 6-13.

As can be seen more clearly from the sectional views of Figure 3 and 4, the preferred rotor 3 is tapered and more particularly is substantially conical in configuration, with its tapered end extending upwardly from the housing 1. The rotor 3 has a main body part 7 and a head part 9 interconnected with the main body part, which head part 9 is mounted for rotation on a boss 11 extending upwardly within the housing. As can be seen most clearly in Figure 3, in side profile the head part 9 has a curved upper surface to enhance movement into the tube holder 105 when the components are brought together.

The boss 11 defines the axis of rotation of the rotor 3, and is substantially cylindrical or tubular and configured for receipt of a pusher 13. The head of the pusher 13 is biased against the underside of the head part 9 of the rotor by a biasing device 15, which is most preferably a compression spring coiled around a shaft of the pusher. The biasing device biases the rotor 3 towards its tapered head end, and therefore towards the tube holder

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tube outlet 67b and out through the first tube outlet 67b, around channel 71, back into the race through the second tube inlet 67c, around the surface of the recess 65 as far as second tube outlet 67d, out through the second tube outlet 67d, over the part of the tube extending inwardly through channel 69 and back out of the housing through channel 73.

5 It will be appreciated that the tube could be inserted through the housing in the other direction, ie in through channel 73 and out through channel 69 if desired.

A transverse hole (not shown) may be provided at the intersection of channels 69 and 73, the hole extending from top to bottom of the tube holder. The edges where the hole meets the channels 69 to 73 would provide a relatively sharp edge against which the tube parts would engage to assist in gripping the tube and maintaining it in position in the tube holder.

10 The portions of the tube located against the surface of the recess 65 are occluded by the rollers 17 of the rotor 3 when the tube holder and rotor are in the configuration shown in Figure 3 and the rotor is rotated. The surfaces of the recess 65 against which the tube is seated provide occluding surfaces, with the tube being compressed between the rollers 17 and those surfaces.

15 20 By having the tube exit and re-enter the tube race as described above, movement of the tube in the axial direction of the rotor during use is inhibited, as the edges of the apertures 67a, 67b, 67c and 67d prevent significant axial movement of the tube. Further, as the rollers only act against discrete parts of the tube, that also serves to minimise longitudinal movement of the tube as the rotor rotates.

25 The rollers 17 on the rotor and the tube holder are configured so that part of the tube is always compressed under at least one roller, to prevent leaking of fluid from the reservoir or backflow into the reservoir.

30 To provide additional stability to the tube in the holder, the inside of the tube holder base 61 includes a number of shaped projections 75, 77 and 79 which are located in channels

providing a tube holder having a housing having a recess for receipt of a pump rotor, a tube race for receipt of a tube around the recess and having a first race part around one part of the recess and a second race part around another part of the recess, a first tube inlet into the first race part and a first tube outlet from the first race part, a second tube inlet into the second race part and a second tube outlet from the second race part;

5 providing a tube; and

moving the tube in a substantially orthogonal direction relative to the tube race such that it extends in through the first tube inlet, around the first race part, out through the first tube outlet, in through the second tube inlet, around the second race part, and out through

10 the second tube outlet.

24. A method as claimed in claim 23, wherein the tube holder is as claimed in any one of claims 2 to 9.

15 25. A method as claimed in claim 24, wherein the tube holder includes a retainer which is in the form of a projection or lip between the first outlet and the second inlet, and wherein the method further includes pulling the installed tube in a direction away from the projection or lip so that the tube is maintained in position within the tube race with part of the tube located behind the projection or lip.

20 26. A method as claimed in any one of claims 23 to 25, wherein the method includes bringing the tube holder into engagement with a pump head to provide the combination of a tube holder and a pump head, and so that the rotor is located in the recess in the tube holder.

25 27. A method as claimed in claim 26, wherein the combination is as claimed in any one of claims 10 to 22.

30 28. The combination of a peristaltic pump head having a tapered pump rotor which is rotatable about an axis of rotation, and a tube holder having a recess for receipt of the tapered end of the rotor, the tube holder having a tube

50. The combination as claimed in claim 49, wherein the stop is in the form of an annular lip on the rotor.

51. A kit of parts for assembling a peristaltic pump head assembly, including:

5 a rotor and a housing having first and second housing parts and configured for receipt of the rotor; which rotor may be assembled with the housing with at least part of the rotor exposed from the housing for engagement with a tube, by snapping the housing parts together such that the pump head assembly can be assembled without the use of adhesives or separate fasteners.

10

52. A kit of parts as claimed in claim 51, wherein the rotor is provided in kit form, and includes a main body part, a head part and at least one roller, which rotor may be assembled by snapping the main body part and head part together to sandwich the roller(s) therebetween.

15

53. A kit of parts as claimed in claim 51 or 52, wherein the rotor is tapered and is mountable for rotation about an axis of rotation within the housing and to be axially biased towards its tapered end, and wherein the rotor includes a stop to limit the axial movement of the rotor relative to the housing when assembled.

20

54. A kit of parts as claimed in claim 53, including a compression spring to axially bias the rotor relative to the housing.

25 55. A kit of parts as claimed in claim 53 or 54, wherein a base of the tapered rotor includes gear teeth, and including a gear with a plurality of teeth to transmit motive force from a drive mechanism to the rotor, the gear teeth of the rotor and the teeth of the gear being of sufficient length to remain engaged during axial movement of the rotor relative to the housing once assembled.

30 56. A kit of parts as claimed in any one of claims 51 to 55, wherein all components are made of a plastics material.

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57. A kit of parts as claimed in any one of claims 51 to 55, wherein all components, other than the spring, are made of a plastics material.

58. A flexible container having a reservoir for holding fluid and including a tube holder directly connected to the flexible container, the tube holder having a tube race around a tapered aperture or recess configured for receipt of a tapered rotor of a peristaltic pump head, and a tube connector configured for connection to a resiliently flexible tube and in fluid communication with the reservoir, which tube holder can be brought into operable connection with the pump head to occlude fluid through a tube 10 connected to the tube connector and extending around the tube race to dispense fluid from the container.

59. A flexible container as claimed in claim 58, including a resiliently flexible tube connected to the tube connector and extending around the tube race.

15 60. A flexible container having a reservoir for holding fluid and including a tube holder directly connected to the flexible container, the tube holder having a tube race around a tapered aperture or recess configured for receipt of a tapered rotor of a peristaltic pump head, and a resiliently flexible tube in fluid communication with the reservoir and extending around the tube race, so that the tube holder can be brought into 20 operable connection with the pump head to occlude fluid through the tube extending around the tube race.

61. A flexible container as claimed in any one of claims 58 to 60, wherein the flexible 25 container includes a plurality of reservoirs sealed from one another, and the tube holder includes a corresponding number of tube races so that the contents of the reservoirs can be independently dispensed via respective tubes.

30 62. A flexible container as claimed in any one of claims 58 to 61, wherein the tube race(s) has/have a first race part around one part of the recess and a second race part around another part of the recess, a first tube inlet into the first race part and a first tube

outlet from the first race part, a second tube inlet into the second race part and a second tube outlet from the second race part; the respective tube being insertable in the respective tube race by movement in a direction substantially orthogonal to the tube race so that it extends in through the first tube inlet, around the first race part, out through the first tube outlet, in through the second tube inlet, around the second race part, and out through the second tube outlet.

5. 63. A flexible container as claimed in claim 62, including a lip or projection between the first outlet(s) and second inlet(s), behind which the respective tube can be located to maintain the tube in position within the tube race.

10. 64. A flexible container as claimed in claim 63, wherein the container includes a neck portion and two separate reservoir portions in a Y-configuration.

15. 65. A flexible container as claimed in any one of claims 58 to 64, wherein the tube holder includes at least one mounting boss which is located in an aperture in a neck of the container.

20. 66. A flexible container as claimed in claim 65, wherein an aperture extends through the mounting boss(es) and into a spigot(s) which comprise(s) the tube connector to which a respective tube is connected, such that tube(s) is/are in fluid communication with a respective reservoir.

25. 67. A container holding at least one fluid for dispensing by a peristaltic pump, the container including a plurality of discrete magnetic or magnetisable areas in predetermined positions on the container to identify the container, which magnetic or magnetisable areas (once magnetised) are configured for detection by a pump assembly having a plurality of sensors in predetermined positions corresponding to the positions of the magnetic or magnetisable areas.

30.

68. A container as claimed in claim 67, wherein the container is of the type claimed in any one of claims 58 to 66, and the magnetic or magnetisable areas are located on the tube holder.

5 69. A container as claimed in claim 67 or 68, wherein the plurality of magnetic areas are provided by magnets.

70. A container as claimed in claim 67 or 68, wherein the plurality of magnetisable areas are provided by one or more strips of material, discrete part(s) of which can be 10 magnetised.

15 71. A container as claimed in claim 67 or 68, wherein the plurality of magnetisable areas are provided by a plurality of items of a material which has no magnetic properties until magnetised.

72. The combination of a container as claimed in any one of claims 67 to 71 and a pump assembly including a plurality of sensors in predetermined positions corresponding to the positions of the magnetic or magnetisable areas, the sensors configured to sense whether the corresponding positions are magnetic or magnetised when the container is in 20 close proximity or contact with the pump assembly.

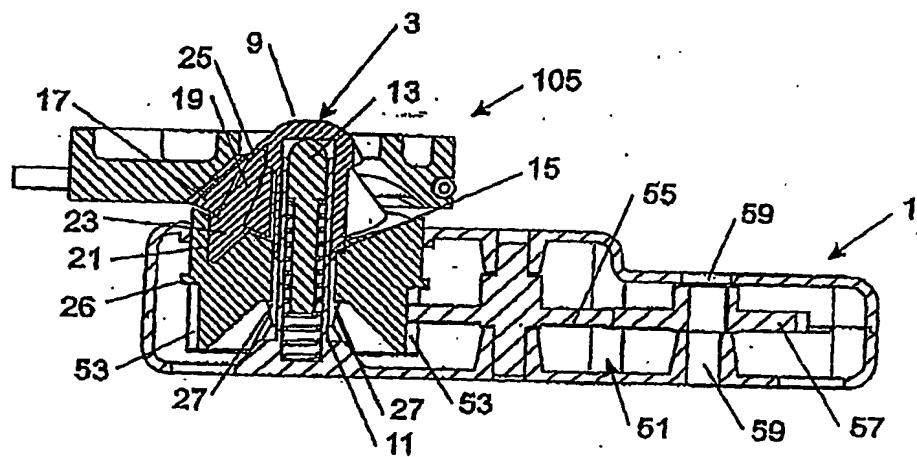
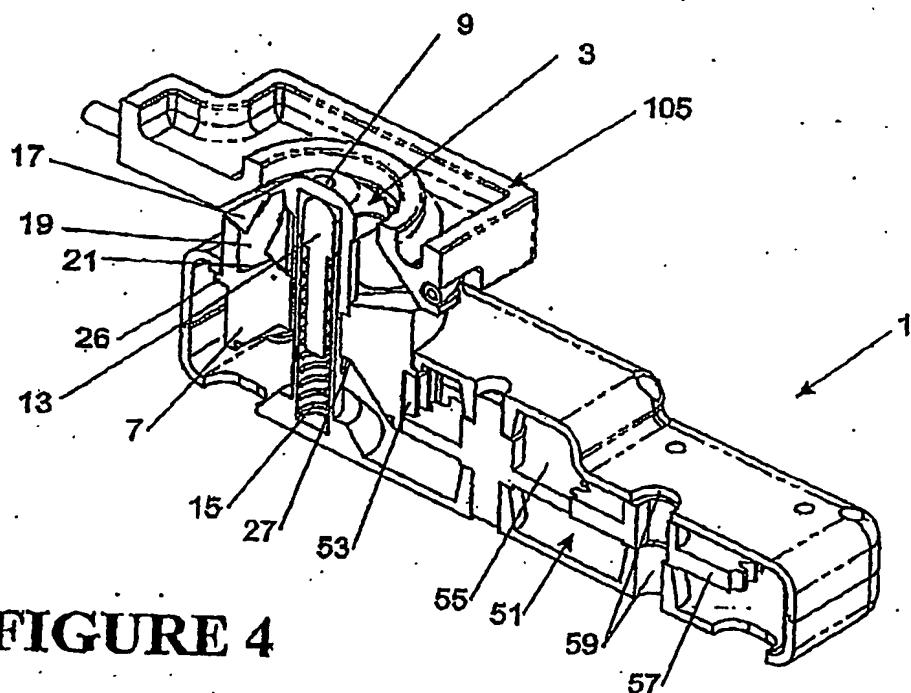
73. The combination as claimed in claim 72, wherein there are a greater number of sensors than there are magnetic or magnetised areas on the container.

25 74. The combination as claimed in claim 72 or 73, wherein the pump assembly further includes a microprocessor and a memory, which microprocessor is configured to determine from the sensors the numbers and positions of the magnetic or magnetised areas, and to then access the memory to determine the substance(s) in the container.

30 75. The combination as claimed in claim 74, wherein the microprocessor is configured to activate a software routine associated with the substance(s) of the container

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**FIGURE 3****FIGURE 4**